

**REPORT ON THE JANUARY 1, 1998  
ACTUARIAL VALUATION OF THE  
WORCESTER COUNTY  
RETIREMENT SYSTEM**

**BUCK  
CONSULTANTS**

February 10, 1999

Retirement Board  
Worcester County Contributory Retirement System  
2 Main Street  
Court House, Room 3  
Worcester, Massachusetts 01608-1184

Board Members:

We have completed an actuarial valuation of the Worcester County Contributory Retirement System as of January 1, 1998. The results are presented in this report.

The Table of Contents, which immediately follows, indicates the material contained in the report.

Respectfully submitted,

Stephen G. Peterson, FSA, EA  
Principal and Consulting Actuary

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## **SECTION I - OVERVIEW**

The Worcester County Retirement Board engaged Buck Consultants to prepare an actuarial valuation of the Retirement System as of January 1, 1998. Employee data and asset information as of this date were provided by the Retirement Board.

The purposes of the valuation were to:

- 1) update the Section 22D funding schedule including provision for Chapter 17 COLA legislation and the effect of the transfer of County employees, and
- 2) to provide reporting and disclosure information for financial statements, governmental agencies, and other interested parties.

Section I contains a summary of the principal valuation results. Section V contains the 20-year projection of the Section 22D funding amounts.

## SECTION II - SUMMARY OF PRINCIPAL RESULTS

1. For convenience of reference, the principal results of the valuation as of January 1, 1998 are summarized below along with a comparison with the amounts as of January 1, 1996.

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<u>1998</u>	<u>January 1, 1996</u>	<u>January 1,</u>
Active members:		
Number	5,395	5,561
Annual compensation	\$ 111,270,545	\$ 134,803,954
Average age	44.4	44.5
Average service	8.2	8.7
Average compensation	\$ 20,625	\$ 24,241
 Pensioners and beneficiaries:		
Number	2,666	2,650
Annual benefits <sup>1</sup>	\$ 16,924,429	\$ 18,149,254
 Inactives		
Number	205	218
Annuity Savings Fund	\$ 989,109	\$ 954,291
 Assets for valuation purposes	\$ 174,065,213	\$ 240,982,371
 Unfunded actuarial (accrued) liability	\$ 117,891,544	\$ 153,348,502
 Section 22D funding for fiscal year 2000	\$ 15,338,827	\$ 16,147,310

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- 1 Excludes cost-of-living adjustments paid after July 1, 1981.
2. Funding requirements, including a year projection of Section 22D costs, are presented in Section II.
3. Schedule B of this report outlines the full set of actuarial assumptions and methods employed. The provisions of the System are summarized in Schedule C.

### **SECTION III - MEMBERSHIP DATA**

1. In order to calculate the aggregate liabilities on account of members of the System as of January 1, 1998, data were needed with respect to each active and retired member and beneficiary of the System. The data with respect to active and retired members and beneficiaries were furnished to the actuary on diskette.
2. Tables showing, as of January 1, 1998, the number and annual regular compensation of members sorted by age and years of service and the number and annual retirement allowances of pensioners and beneficiaries sorted by age are presented in Schedule D.

## SECTION IV - ASSETS

1. The amount of assets taken into account in this valuation is based on financial information reported by the Retirement Board.
2. The assets of the Retirement System for valuation purposes consist of the following:
  - (a) Annuity Savings Fund - The Annuity Savings Fund is the fund in which deductions from the compensation of members are accumulated. When a member retires, his accumulated deductions are transferred from the Annuity Savings Fund to the Annuity Reserve Fund. The assets credited to the Annuity Savings Fund as of January 1, 1998 amount to \$85,594,935.
  - (b) Annuity Reserve Fund - The Annuity Reserve Fund is the fund from which are paid all annuities provided by the accumulated deductions of members. The assets credited to the Annuity Reserve Fund as of January 1, 1998 amount to \$25,740,298.
  - (c) Pension Fund - The Pension Fund is the fund from which pensions are paid. The assets credited to the Pension Fund as of January 1, 1998 amounted to \$19,305,689.
  - (d) Annuity Savings Fund for Military Service - The Annuity Savings Fund for Military Service is the fund in which monies are accumulated on behalf of members who are on military leave. Contributions are made by the County by means of a transfer from the Pension Fund in order to provide benefits for the periods a member serves in the military. The assets credited to the Annuity Savings Fund for Military Service as of January 1, 1998 amount to \$22,998.
  - (e) Pension Reserve Fund - The Pension Reserve Fund is the fund in which contributions of the County are accumulated. The assets credited to the Pension Reserve Fund as of January 1, 1998 amount to \$107,023,183.

The market value of the above Funds amounts to \$237,687,103 plus a market value adjustment of \$3,295,268 for a total of \$240,982,371. For valuation purposes, assets are based upon market value.



## **SECTION V - BENEFITS AND CONTRIBUTIONS PAYABLE UNDER THE SYSTEM**

Section 22D of Chapter 32 provides that a Contributory Retirement System may elect to establish a funding schedule that includes amortization of the unfunded actuarial liabilities and a normal cost. The normal cost and unfunded actuarial liability are calculated in accordance with the entry age normal actuarial cost method. Amortization of the unfunded actuarial liability is to be based on a schedule that ends no later than the year 2028. The annual amortization of the unfunded actuarial liability may increase each year by  $4\frac{1}{2}\%$ .

The table on the following page presents the projection of the funding requirements under Section 22D. The Section 22D funding requirements were computed assuming that one half the contribution is payable on July 1 (start of fiscal year) and the remainder is payable on December 31.

The unfunded liability entries are based on amortization of the unfunded actuarial liability attributed to active and retired members through fiscal year 2023 and amortization of the unfunded actuarial liability attributed to the ERI program through fiscal year 2009.

**WORCESTER COUNTY CONTRIBUTORY RETIREMENT SYSTEM**

Fiscal Year Ending in	Normal Cost	Amortization of the Unfunded Actuarial Liability			Total Appropriation
		Window	Balance	Total Payment	
2000	\$ 6,576,488	\$ 487,814	\$ 9,083,008	\$ 9,570,822	\$ 16,147,310
2001	6,905,312	487,814	9,491,744	9,979,558	16,884,870
2002	7,250,578	487,814	9,918,872	10,406,686	17,657,264
2003	7,613,107	487,814	10,365,222	10,853,036	18,466,143
2004	7,993,762	487,814	10,831,657	11,319,471	19,313,233
2005	8,393,450	487,814	11,319,081	11,806,895	20,200,345
2006	8,813,123	487,814	11,828,439	12,316,253	21,129,376
2007	9,253,779	487,814	12,360,719	12,848,533	22,102,312
2008	9,716,468	487,814	12,916,952	13,404,766	23,121,234
2009	10,202,291	487,814	13,498,215	13,986,029	24,188,320
2010	10,712,406	-	14,105,634	14,105,634	24,818,040
2011	11,248,026	-	14,740,387	14,740,387	25,988,413
2012	11,810,427	-	15,403,704	15,403,704	27,214,131
2013	12,400,948	-	16,096,871	16,096,871	28,497,819
2014	13,020,995	-	16,821,230	16,821,230	29,842,225
2015	13,672,045	-	17,578,186	17,578,186	31,250,231
2016	14,355,647	-	18,369,204	18,369,204	32,724,851
2017	15,073,429	-	19,195,817	19,195,817	34,269,246
2018	15,827,100	-	20,059,629	20,059,629	35,886,729
2019	16,618,455	-	20,962,312	20,962,312	37,580,767
2020	17,449,378	-	21,905,617	21,905,617	39,354,995
2021	18,321,847	-	22,891,370	22,891,370	41,213,217
2022	19,237,939	-	23,921,482	23,921,482	43,159,421
2023	20,199,836	-	24,997,948	24,997,948	45,197,784
2024	21,209,828	-	26,122,855	26,122,855	47,332,683
2025	22,270,319	-	27,298,383	27,298,383	49,568,702
2026	23,383,835	-	28,526,809	28,526,809	51,910,644
2027	24,553,027	-	29,810,515	29,810,515	54,363,542
2028	25,780,678	-	31,151,988	31,151,988	56,932,666
2029	27,069,712	-	-	-	27,069,712
2030	28,423,198	-	-	-	28,423,198

## SECTION VI - ACCOUNTING INFORMATION

Based on our interpretation of Statement No. 5 of the Governmental Accounting Standards Board, the pension benefit obligations for the System were \$384,544,802 computed as of January 1, 1998. This value was based on an assumed interest rate of 8.5%. The pension benefit obligation exceeds the market value of assets as of January 1, 1998 as shown below:

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1.	Pension benefit obligation	
	A. Retirees and beneficiaries currently receiving benefits and terminated employees entitled to benefits but not yet receiving them	\$ 173,374,593
	B. Current employees	
	i. Accumulated employee contributions	\$ 85,594,935
	ii. County financed vested	37,585,690
	iii. County financed nonvested	30,751,929
	iv. Future salary increases	<u>57,237,655</u>
	C. Total	\$ 384,544,802
2.	Market value of assets	\$ 240,982,371
3.	Excess of pension benefit obligation over market value of assets	\$ 143,562,431

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**SCHEDULE A - RESULTS OF THE VALUATION**

As of January 1, 1998 (Reflecting Chapter 17 COLA Legislation)

1.	Present value of prospective benefits payable in respect of	
	Present retired member and beneficiaries	\$ 172,420,302
	Present active members*	380,069,329
	Present inactive members	<u>954,291</u>
	Total actuarial liabilities	\$ 553,443,922
2.	Present value of future contributions by members*	\$ 95,611,678
3.	Present value of future normal contributions by the County	\$ 63,501,371
4.	Accrued liability, 1. -2. -3.	\$ 394,330,873
5.	Assets	\$ 240,982,371
6.	Unfunded accrued liability, 4. -6.	\$ 153,348,502
7.	Funded ratio, 5. ÷ 4.	61.1
8.	Present value of future normal contributions by the County,	\$ 63,501,371
9.	Present value of future salaries	\$1,139,926,300
10.	Normal contribution rate, 8. ÷ 9.	5.57%
11.	Annualized compensation*	\$ 107,091,965
12.	Normal cost, fiscal year 1998	\$ 5,965,022
13.	Normal cost payable by County, fiscal year 2000	\$ 6,576,488
*	Items adjusted to reflect transfer of County employees.	

## SCHEDULE B - ACTUARIAL ASSUMPTIONS AND METHODS

### GENERAL EMPLOYEES

VALUATION INTEREST RATE: 8.5% per annum, compounded annually.

SEPARATIONS FROM ACTIVE SERVICE: Representative values of the assumed annual rates of withdrawal and vesting, disability, death and service retirement are as follows:

#### Annual Rates of

Age	Withdrawal and Vesting	Disability*	Death*	Service Retirement
25	9.5%	.12%	.04%	
30	8.9	.13	.05	
35	7.0	.15	.07	
40	4.5	.17	.10	
45	3.1	.21	.16	
50	2.6	.32	.28	
55	1.7	.50	.43	10.0%
60		.81	.67	5.0
62		.81	.82	10.0
65		.81	1.13	25.0
69			1.79	25.0

\*Assumed that 50% of all disability retirements and deaths are due to accidents in the performance of duty.

COST OF LIVING ADJUSTMENTS: Retirement benefits were assumed to increase annually by 3%, up to a maximum of \$360.

SALARY INCREASES: Salaries were assumed to increase annually by 4.5% for each active member.

DEATHS AFTER RETIREMENT: For members and beneficiaries in receipt of pensions on January 1, 1995, combined Annuity Mortality Tables Modified and Makehamized, with a 1-year setback in ages for males and a 7-year setback for females. For current active members, the 1983 Group Annuity Mortality (GAM) Table set forward 3½ years for males. For the period after disability retirement, special mortality tables are used.

SPOUSES: 85% of male employees and 45% of female employees are assumed to be married with wives four years younger than husbands.

LOADING OR CONTINGENCY RESERVE: None.

ACTUARIAL COST METHOD: Aggregate entry age normal cost method.

POLICE AND FIRE

VALUATION INTEREST RATE: 8.5% per annum, compounded annually.

SEPARATIONS FROM ACTIVE SERVICE: Representative values of the assumed annual rates of withdrawal and vesting, disability, death and service retirement are as follows:

Annual Rates of

Age	Withdrawal and Vesting	Disability*	Death*	Service Retirement
25	2.9%	.23%	.05%	
30	2.3	.34	.06	
35	1.6	.48	.00	
40	1.0	.62	.12	
45	.5	1.29	.22	
50		1.30	.39	10.0%
55		1.89	.61	10.0
60			.92	36.0
62			1.11	16.0
64			1.89	24.0

\*Assumed that 90% of all disability retirements and deaths are due to accidents in the performance of duty.

SALARY INCREASES: Salaries were assumed to increase annually by 4.5% for each active member.

COST OF LIVING ADJUSTMENTS: Retirement benefits were assumed to increase annually by 3%, up to a maximum of \$360.

DEATHS AFTER RETIREMENT: For members and beneficiaries in receipt of pensions on January 1, 1995, combined Annuity Mortality Tables Modified and Makehamized, with a 1-year setback in ages for males and a 7-year setback for females. For current active members, the 1983 Group Annuity Mortality (GAM) Table set forward 3½ years for males. For the period after disability retirement, special mortality tables are used.

SPOUSES: 85% of male employees and 45% of female employees are assumed to be married with wives four years younger than husbands.

LOADING OR CONTINGENCY RESERVE: None.

ACTUARIAL COST METHOD: Aggregate entry age normal cost method.

## SCHEDULE C - SUMMARY OF SYSTEM PROVISIONS

### MEMBERSHIP

The Retirement System covers all employees of the County except teachers and elected officials.

### SUMMARY OF BENEFIT AND CONTRIBUTION PROVISIONS

A summary of the main benefit and contribution provisions of the Retirement System, as interpreted for the valuation, is presented below.

The terms “Group 1” and “Group 4” are used to denote “general employees” and “police and fire”, respectively.

### BENEFITS

Final Average Salary (FAS)	The average of a member’s 3 highest consecutive years’ compensation.
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#### Superannuation Retirement

Eligibility	Age 65 for Group 1; Age 55 for Group 4. Maximum retirement age is 70 for Group 1 and 65 for Group 4.
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Allowance	2.5% per year of service times FAS. Veterans receive additional \$15 annually per year of service to a maximum of \$300 annually. Maximum total allowance is 80% of FAS.
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#### Early Retirement

Eligibility	20 years of service.
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Allowance	Calculated as a superannuation retirement allowance (including veteran’s benefits) except accrual rate is equal to 2.5% reduced by .1% for each year age at retirement is below either 65 for Group 1 or 55 for Group 4.
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The minimum allowance after 30 years of service is equal to:

- (1) An annuity which is the actuarial equivalent of member's accumulated deductions; and
- (2) A pension equal to 1/3 of FAS and any veteran's benefits as described under superannuation retirement.

## Vested Retirement

**Eligibility** 10 years of service. For certain involuntary terminations, this is reduced to 6 years.

**Allowance** A superannuation retirement allowance commencing at age 55 for Group 1 members and age 45 for Group 4 members or later, where the accrual rate is determined by the age of the member at the time the allowance commences.

## Ordinary Disability

**Eligibility** For nonveterans, 10 years of service prior to age 55 for Group 1 members or age 45 for Group 4 members. For veterans, 10 years of service prior to maximum retirement age.

**Allowance** An immediate allowance equal to the age 55 rate for Group 1 members or age 45 rate for Group 4 members per year of service times FAS.

Veterans receive an allowance equal to:

- (1) An annuity which is the actuarial equivalent of their accumulated deductions; and
- (2) A pension which is the greater of 50% of current salary and the service retirement allowance to which they are eligible, if any.

## Accidental Disability

**Eligibility** None.

**Allowance** An immediate allowance equal to:

- (1) An annuity which is the actuarial equivalent of the member's accumulated deductions; and
- (2) A pension equal to 72% of current salary; and
- (3) A supplement equal to \$450 per year per child under 21.

The maximum total allowance is 100% of current salary.

#### Accidental Death Benefit

Eligibility None.

Allowance An immediate allowance equal to:

- (1) A lump sum payment equal to the accumulated deductions at death; and
- (2) A pension equal to 72% of current salary and payable to the surviving spouse, dependent children, or the dependent parents; and
- (3) A supplement of \$312 per year per child payable to the spouse or legal guardian until all children reach age 21, unless handicapped.

The maximum total allowance is 100% of current salary.

#### Death in Active Service

Eligibility None.

Allowance An immediate allowance that would have been payable had the member retired and elected the 2/3 joint and survivor option on the day before his death. For death occurring prior to the minimum superannuation retirement age, the age 55 and age 45 accrual rates are used, respectively, for Group 1 and Group 4 members.

For members with at least 2 years of service at death, the surviving spouse receives an additional allowance equal to the sum of \$960 per year for the first child and \$720 per year for each additional child.

The minimum allowance is \$140 per month. The maximum total allowance is 100% of salary at the date of death.

Normal Form of Benefit	Reduced modified cash refund annuity.
Optional Forms of Benefit	(1) Life annuity. (2) Modified cash refund annuity. (3) 66-2/3% joint and survivor allowance.
Return of Contribution	If no other benefit is payable upon termination, the member's accumulated deductions are returned.
Post-Retirement Adjustments	Up to 3% of the annual retirement allowance (\$360 maximum each year)
Member Contributions	Members contribute a percentage of annual regular compensation in accordance with their respective dates of hire, as shown below:

<u>Date of Hire</u>	<u>Rate of Contribution</u>
Prior to January 1, 1975	5%
On or after January 1, 1975	7%
On or after January 1, 1984	8%
On or after July 1, 1996	9%

Members hired on or after January 1, 1979 contribute an additional 2% of compensation in excess of \$30,000.

**SCHEDULE D**

**MEMBERSHIP TABLES**

TABLE 1

THE NUMBER AND ANNUAL COMPENSATION OF ACTIVE MEMBERS DISTRIBUTED BY  
FIFTH AGE AND SERVICE AS OF JANUARY 1, 1998

SERVICE AGE	1	5	10	15	20	25	30	35	40	45	50	TOTAL
15-19	3											3 NUMBER
	36,091											36,091 SALARY
20-24	121	13										134 NUMBER
	1,745,115	305,270										2,050,385 SALARY
25-29	259	132	27									418 NUMBER
	4,681,939	3,612,329	844,831									9,139,099 SALARY
30-34	192	165	163	14								534 NUMBER
	3,288,224	4,901,036	5,418,523	505,041								14,112,824 SALARY
35-39	271	196	132	74	20							693 NUMBER
	4,255,360	4,963,954	4,140,996	2,578,592	630,137							16,569,039 SALARY
40-44	299	270	181	91	73	16						930 NUMBER
	4,622,161	6,013,946	5,057,673	3,303,658	2,521,311	511,257						22,030,006 SALARY
45-49	245	276	264	85	71	75	17					1,033 NUMBER
	3,789,179	6,009,918	6,703,745	2,436,330	2,539,498	2,979,170	637,962					25,095,802 SALARY
50-54	129	172	194	83	75	68	38	9				768 NUMBER
	2,029,755	3,839,364	4,903,541	2,327,458	2,282,799	2,505,399	1,445,931	304,065				19,638,312 SALARY
55-59	55	111	135	76	75	81	26	14	2			575 NUMBER
	970,466	2,566,356	3,534,057	1,937,101	2,012,473	2,345,244	834,157	496,500	29,241			14,725,595 SALARY
60-64	21	45	62	45	62	42	31	12	2	3		325 NUMBER
	316,347	835,617	1,598,488	1,265,298	1,427,633	1,210,622	880,626	474,440	5,779	121,561		8,136,411 SALARY
65-69	4	11	16	10	11	18	16	2	1			89 NUMBER
	61,876	279,245	425,565	279,744	278,118	274,717	373,409	82,656	2,350			2,057,680 SALARY
70-74	2	3	10	1	6	8	9	3			1	43 NUMBER
	20,050	42,999	193,637	16,113	129,490	145,880	217,474	120,979			45,665	932,287 SALARY
75-79		1		1	5	2	3		2			14 NUMBER
		8,782		23,944	92,479	18,832	48,598		68,075			260,710 SALARY
80+	1				1							2 NUMBER
	12,425				7,288							19,713 SALARY
TOTAL	1,602	1,395	1,184	480	399	310	140	40	7	3	1	5,561 NUMBER
	25,828,988	33,378,816	32,821,056	14,673,279	11,921,226	9,991,121	4,438,157	1,478,640	105,445	121,561	45,665	134,803,954 SALARY

TABLE 2

**THE NUMBER AND ANNUAL PENSION OF RETIRED MEMBERS  
AND BENEFICIARIES DISTRIBUTED BY AGE AS OF JANUARY 1, 1998**

<b>AGE</b>	<b>NUMBER</b>	<b>PENSIONS</b>
44 AND UNDER	13	232,512
45	6	64,912
46	3	28,277
47	5	9,965
48	7	46,471
49	6	88,185
50	12	143,168
51	9	41,124
52	6	23,442
53	7	98,000
54	13	51,412
55	14	256,806
56	23	326,617
57	16	214,855
58	35	332,885
59	33	364,329
60	44	503,352
61	34	340,209
62	51	424,179
63	71	635,476
64	56	547,550
65	70	640,353
66	101	926,103
67	99	825,374
68	85	741,332
69	111	1,071,379
70	114	905,111
71	114	889,107
72	107	789,087
73	115	658,822
74	121	611,178
75	126	664,641
76	110	544,561
77	126	646,628
78	102	457,911
79	106	459,282
80	89	325,043
81	66	255,845
82	64	228,995
83	64	200,713
84	54	165,245
85	48	154,036
86	56	175,947
87	42	181,251
88	22	56,416
89	27	95,421
90	23	70,670
91	19	53,853
92	11	25,483
93	14	42,765
94	7	26,536
95	9	33,652
96	5	16,466
97	2	5,122
100	1	1,643
101	3	3,630
102	1	1,098
106	1	3,179
107	1	1,650
<b>TOTAL</b>	<b>2,700</b>	<b>\$18,149,254</b>